

Automatic Hydroponics Farm

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Abstract— Due to development of urbanisation and civilization, open field and soil based agriculture are facing some major issues like water scarcity, demand for labours and lack of agriculture land, etc. To overcome these consequences we proposed an idea called HYDROPONICS. It utilizes the technology for growing plants in nutrient solutions where the artificial medium provides the mechanical support. The nutrient solution can be provided using solenoid valve depending upon the pH content of the water.

Key words: Hydroponics, Nutrient Solution, Open Field Agriculture, Soil-Less Culture

I. INTRODUCTION

Hydroponics is a subspace of hydroculture. The term Hydroponics derived from the Greek words ‘hydro’ means water and ‘ponos’ means labour. Hydroponics is the techniques of growing a plant in nutrient solution without using soil medium with their roots are submerged in the nutrient solution. Tomato, Spinach, Mint and betel can be cultivated by hydroponics system.

A seasonal change does not affect this farming. So, farming can be done at any time at any climate within a small space.

II. PROPOSED MODEL

In this proposed model periodic monitoring is completely automated to avoid the manual checking and nutrient supply through solenoid valve interfaced with Arduino.

III. BLOCK DIAGRAM

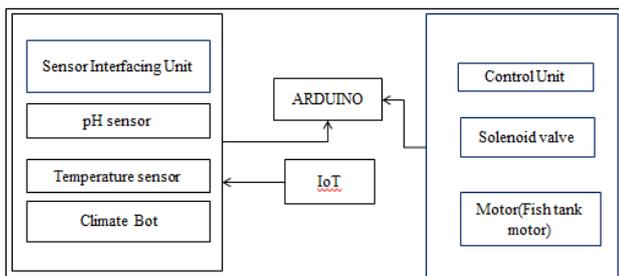


Fig. 1.1: Block Diagram

IV. COMPONENTS USED

- Arduino
- pH meter
- Climate Bot
- Solenoid valve
- IoT

V. ARDUINO

Arduino is an open-source platform used for developing electronics projects.



Fig. 1.2: Arduino board

It consists of a physical programmable circuit used to write and upload computer code to the physical board. In this proposed hydroponics system Arduino is used to interfacing the sensor units and control units.

VI. CLIMATE BOT

Climate bot acts as the environmental controls for indoor operation. It is used to check the environmental condition like temperature, pressure, humidity etc.

VII. pH METER

The rate of the chemical reactions and its result taking place in water often depend on the acidity of the water. The acidity of the water can be easily measured by pH meter. In this proposed system depending upon the type of crop which needs to be yield, nutrient solution should be supplied with an appropriate balanced pH level of the water.



Fig. 1.3: pH Meter

VIII. IoT

IoT stands for Internet of Things. IoT represents the general concept for the ability of network devices to sense and collect data from the world around us and then save those collected data across the internet where it can be processed and utilized for the various interesting purpose. It is a worldwide network of interconnected objects which are interfaced with sensors and actuators. In this proposed system IoT is used to collect the data from all the sensors and store the sensed data in it.

By developing an application we can get all the details regarding our proposed system through mobile phone itself using IoT stored data.

IX. LABORATORY SETUP

The proposed hydroponic system is built by using water pipes. Pipes can be arranged in a serial or parallel manner depending upon space availability.



Fig. 1.4: Laboratory Setup

X. WORKING

In the proposed hydroponics system, water with appropriate nutrients will be circulated through the water pipes. pH level of the water will be monitored by pH level sensor continuously. If the rated pH value gets varied, accordingly pH level sensor will sense and gives a signal to the solenoid valve. Through solenoid valve automatically required nutrients will be supplied to the water. So that the nutrient value in the water will be maintained for a particular sampling at an appropriate level and through which we can yield a sampling with good nutrients.



Fig. 1.5: Working Model

In the mean, while data like the temperature at which the sampling is in the solution, pH level of the water will be communicated through mobile phone by using IoT so that manual inspection can be eliminated.

XI. SCOPE OF THE PROPOSED MODEL

Electricity can be generated using water circulating force by connecting the turbine at the water inlet. This electricity can be utilized for motor operation and solenoid valve control.

XII. ADVANTAGES

- Minimal usage of water compared to land agriculture.
- Crops grow two times faster in hydroponic farming method.
- High yield of productivity with smaller space.
- The nutrient level can be monitored within the medium.
- Eliminating the need for more space and nutrient reinforced soil.
- Easily eradicate pest and weeds.

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